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SIMPLIFYING BROWSER SEARCH REQUESTS

BACKGROUND OF THE INVENTION

5 1. Technical Field:

The present invention relates generally to an improved data processing system and, in particular, to a method, system, and computer program for searching for data. Still more particularly, the present invention
10 relates to a method, system, and computer program for simplifying search requests.

2. Description of Related Art:

The Internet, also referred to as an "internetwork",
15 is a set of computer networks, possibly dissimilar, joined together by means of gateways that handle data transfer and the conversion of messages from the sending network to the protocols used by the receiving network (with packets if necessary). When capitalized, the term "Internet"
20 refers to the collection of networks and gateways that use the TCP/IP suite of protocols.

The Internet has become a cultural fixture as a source of both information and entertainment. Many businesses are creating Internet sites as an integral part
25 of their marketing efforts, informing consumers of the products or services offered by the business or providing other information seeking to engender brand loyalty. Many federal, state, and local government agencies are also employing Internet sites for informational purposes,
30 particularly agencies which must interact with virtually all segments of society such as the Internal Revenue Service and secretaries of state. Providing informational

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guides and/or searchable databases of online public records may reduce operating costs. Further, the Internet is becoming increasingly popular as a medium for commercial transactions.

5 Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, also called simply "the Web". Other Internet resources exist for transferring information, such as File Transfer Protocol (FTP) and Gopher, but have
10 not achieved the popularity of the Web. In the Web environment, servers and clients effect data transaction using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text, still graphic images, audio, motion video,
15 etc.). The information in various data files is formatted for presentation to a user by a standard page description language, the Hypertext Markup Language (HTML). In addition to basic presentation formatting, HTML allows developers to specify "links" to other Web
20 resources identified by a Uniform Resource Locator (URL). A URL is a special syntax identifier defining a communications path to specific information. Each logical block of information accessible to a client, called a "page" or a "Web page", is identified by a URL. The URL
25 provides a universal, consistent method for finding and accessing this information, not necessarily for the user, but mostly for the user's Web "browser". A browser is a program capable of submitting a request for information identified by an identifier, such as, for example, a URL.
30 A user may enter a domain name through a graphical user interface (GUI) for the browser to access a source of content. The domain name is automatically converted to the Internet Protocol (IP) address by a domain name system

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(DNS), which is a service that translates the symbolic name entered by the user into an IP address by looking up the domain name in a database.

The Internet also is widely used to transfer applications to users using browsers. With respect to commerce on the Web, individual consumers and business use the Web to purchase various goods and services. In offering goods and services, some companies offer goods and services solely on the Web while others use the Web to extend their reach.

Currently, when a user searches for text or information on a Web site, the user must enter the site itself. After entering the site, a "search" option is selected. A search query is entered into the fields provided and the search is activated or initiated by selecting or pressing a search button. Such a search process requires a number of steps and time. For example, entering a Web site often is not immediate and takes some amount of time, depending on the graphics and other features provided, a significant amount of time may pass before the Web site is entered, especially if the user is accessing the Internet through a dialup connection. After entering the site, the user must find the page or enter search queries when a search option is found for the site. These additional steps also take time. Most users on the Web are impatient and do not like to wait for content to be downloaded for presentation. The amount of time and steps frustrate users exploring the Web. Additionally, even if the user is accessing Web sites through a broad band connection, such as a cable or digital subscriber line (DSL) connection, traffic at the Web site or on nodes between the user and the Web site also may cause delays.

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Therefore, it would be advantageous to have an improved method, apparatus, and computer instructions for searching a Web site.

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SUMMARY OF THE INVENTION

The present invention provides a method, apparatus, and computer program for searching for information. In response to receiving an input string, the input string is parsed for a universal resource identifier and a search string, wherein the universal resource locator and the search string are separated from each other in the input string by a selected character. The information corresponding to the search string is searched through a Web page identified by the universal resource identifier. The information may be searched by at least one of (a) locating a search object on the Web page, and using the search object to search for the information; and (b) searching the Web page for information corresponding to the search string

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

10 **Figure 1** is a pictorial representation of a data processing system in which the present invention may be implemented in accordance with a preferred embodiment of the present invention;

15 **Figure 2** is a block diagram of a data processing system shown in which the present invention may be implemented;

Figure 3 is a block diagram of a browser program in accordance with a preferred embodiment of the present invention;

20 **Figure 4** is a diagram illustrating an address field in a browser in accordance with a preferred embodiment of the present invention.

25 **Figure 5** is a flowchart of a process used for implementing a simplified search mechanism in accordance with a preferred embodiment of the present invention;

Figures 6A and 6B are flowcharts of a process for determining whether a search object is present in accordance with a preferred embodiment of the present invention; and

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Figures 7A and **7B** are diagrams illustrating one method of code used for finding a search object in an HTML document in accordance with a preferred embodiment of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular with reference to **Figure 1**, a pictorial representation of a data processing system in which the present invention may be implemented is depicted in accordance with a preferred embodiment of the present invention. A computer 100 is depicted which includes a system unit 102, a video display terminal 104, a keyboard 106, storage devices 108, which may include floppy drives and other types of permanent and removable storage media, and mouse 110. Additional input devices may be included with personal computer 100, such as, for example, a joystick, touchpad, touch screen, trackball, microphone, and the like. Computer 100 can be implemented using any suitable computer, such as an IBM RS/6000 computer or IntelliStation computer, which are products of International Business Machines Corporation, located in Armonk, New York. Although the depicted representation shows a computer, other embodiments of the present invention may be implemented in other types of data processing systems, such as a network computer. Computer 100 also preferably includes a graphical user interface that may be implemented by means of systems software residing in computer readable media in operation within computer 100.

With reference now to **Figure 2**, a block diagram of a data processing system is shown in which the present invention may be implemented. Data processing system 200 is an example of a computer, such as computer 100 in **Figure 1**, in which code or instructions implementing the processes of the present invention may be located. Data

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processing system 200 employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor 202 and main memory 204 are connected to PCI local bus 206 through PCI bridge 208. PCI bridge 208 also may include an integrated memory controller and cache memory for processor 202. Additional connections to PCI local bus 206 may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter 210, small computer system interface SCSI host bus adapter 212, and expansion bus interface 214 are connected to PCI local bus 206 by direct component connection. In contrast, audio adapter 216, graphics adapter 218, and audio/video adapter 219 are connected to PCI local bus 206 by add-in boards inserted into expansion slots. Expansion bus interface 214 provides a connection for a keyboard and mouse adapter 220, modem 222, and additional memory 224. SCSI host bus adapter 212 provides a connection for hard disk drive 226, tape drive 228, and CD-ROM drive 230. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

25 An operating system runs on processor 202 and is used to coordinate and provide control of various components within data processing system 200 in **Figure 2**. The operating system may be a commercially available operating system such as Windows 2000, which is available from

30 Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provides calls to the operating

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system from Java programs or applications executing on data processing system 200. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented programming system, and applications
5 or programs are located on storage devices, such as hard disk drive 226, and may be loaded into main memory 204 for execution by processor 202.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 2** may vary depending on the
10 implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 2**. Also, the processes of the present invention
15 may be applied to a multiprocessor data processing system.

For example, data processing system 200, if optionally configured as a network computer, may not include SCSI host bus adapter 212, hard disk drive 226,
20 tape drive 228, and CD-ROM 230, as noted by dotted line 232 in **Figure 2** denoting optional inclusion. In that case, the computer, to be properly called a client computer, must include some type of network communication interface, such as LAN adapter 210, modem 222, or the
25 like. As another example, data processing system 200 may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system 200 comprises some type of network communication interface. As a further
30 example, data processing system 200 may be a personal digital assistant (PDA), which is configured with ROM and/or flash ROM to provide non-volatile memory for

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storing operating system files and/or user-generated data.

The depicted example in **Figure 2** and above-described examples are not meant to imply architectural
5 limitations. For example, data processing system **200** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **200** also may be a kiosk or a Web appliance.

The processes of the present invention are performed
10 by processor **202** using computer implemented instructions, which may be located in a memory such as, for example, main memory **204**, memory **224**, or in one or more peripheral devices **226-230**.

Turning next to **Figure 3**, a block diagram of a
15 browser program is depicted in accordance with a preferred embodiment of the present invention. A browser is an application used to navigate or view information or data in a distributed database, such as the Internet or the World Wide Web.

20 In this example, browser **300** includes a user interface **302**, which is a graphical user interface (GUI) that allows the user to interface or communicate with browser **300**. This interface provides for selection of various functions through menus **304** and allows for
25 navigation through navigation **306**. For example, menu **304** may allow a user to perform various functions, such as saving a file, opening a new window, displaying a history, and entering a URL. Navigation **306** allows for a user to navigate various pages and to select Web sites
30 for viewing. For example, navigation **306** may allow a user to see a previous page or a subsequent page relative to the present page. Preferences such as those

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illustrated in **Figure 3** may be set through preferences **308**.

Communications **310** is the mechanism with which browser **300** receives documents and other resources from a network such as the Internet. Further, communications **310** is used to send or upload documents and resources onto a network. In the depicted example, communication **310** uses HTTP. Other protocols may be used depending on the implementation. Documents that are received by browser **300** are processed by language interpretation **312**, which includes an HTML unit **314** and a JavaScript unit **316**. Language interpretation **312** will process a document for presentation on graphical display **318**. In particular, HTML statements are processed by HTML unit **314** for presentation while JavaScript statements are processed by JavaScript unit **316**.

Graphical display **318** includes layout unit **320**, rendering unit **322**, and window management **324**. These units are involved in presenting Web pages to a user based on results from language interpretation **312**.

Browser **300** is presented as an example of a browser program in which the present invention may be embodied. Browser **300** is not meant to imply architectural limitations to the present invention. Presently available browsers may include additional functions not shown or may omit functions shown in browser **300**. A browser may be any application that is used to search for and display content on a distributed data processing system. Browser **300** may be implemented using known browser applications, such as Netscape Navigator or Microsoft Internet Explorer. Netscape Navigator is available from Netscape Communications Corporation while Microsoft Internet

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Explorer is available from Microsoft Corporation.

The present invention provides a method, apparatus, and computer instructions for simplifying the process for searching a Web site for information. The mechanism of
5 the present invention allows the user to search the desired text by entering search text within the URL entry field in a browser.

Turning next to **Figure 4**, a diagram illustrating an address field in a browser is depicted in accordance with
10 a preferred embodiment of the present invention. Address field **400** in this example includes URL **402** and search string **404** separated by delimiter **406**. In this example, the delimiter is a "\$", but any delimiter may be used depending on the implementation. The mechanism of the
15 present invention parses the entry and address field **400** and uses URL **402** as the starting Web site page and search string **404** as the string to be used as search text for searching for information at the Web site.

The mechanism of the present invention searches for
20 a search object that may be located in the starting Web page. This search object may be executed by the mechanism of the present invention through various methods, such as a script file, application, or browser application. The mechanism searches the Web page for a
25 tag FORM containing an action with a key word, such as, for example, search or find. If the action tag is one that contains a possible search object, the mechanism finishes parsing the form and collects input tag parameters of name, type, and value in an input object.
30 Using this information, a URL with an action tag value is formulated. Values placing the search text in the appropriate input field are entered by the mechanism and

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submitted with the form. The search results from using an object on the Web site or searching the pages directly are processed and may be presented to the user.

If a search object is absent the mechanism of the present invention may search the Web site directly. For example, at the starting Web site page, the mechanism of the present invention may search the page and any URL's contained in that page to identify the search text entered within address field 400. When pages and links on pages are searched, any number of levels may be searched depending on the particular implementation.

Turning now to **Figure 5**, a flowchart of a process used for implementing a simplified search mechanism is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 5** may be implemented using computer instructions in browser 300 in **Figure 3**.

The process begins by receiving a URL entry, (step 500). A determination is then made as to whether this entry contains a delimiter (step 502). If the URL entry contains a delimiter, then the base URL is searched for a search object (step 504). A determination is then made as to whether this base Web page identified by the URL contains a search object (step 506). If a search object is present, then the search object is parsed to identify search criteria (step 508). The identified search criteria is filled in (step 510). Thereafter, the search is submitted (step 512). Search results are received (step 514), and the results are presented to the user (step 516) with the process terminating thereafter.

With reference again to step 506, if the base Web page does not have a search object, then a simple search

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of the page and linked pages are performed (step 518) with the process then proceeding to step 516 as described above.

With reference again to step 502, if the URL does not contain a delimiter, then the base Web page identified by the URL is presented to the user step 520 with the process terminating thereafter.

Turning next to **Figures 6A** and **6B**, flowcharts of a process for determining whether a search object is present is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figures 6A** and **6B** may be implemented as computer instructions and is a more detailed description of step 504 in **Figure 5**. The process begins querying the base URL (step 600). A response containing an HTML document is received (step 602). The HTML document is searched for an HTML FORM tag (step 604). A determination is made as to whether a FORM tag is present in the HTML document (step 606). If a FORM tag is present, then the information identified by the FORM tag is read and parsed to identify an HTML ACTION tag (step 608). A determination is made as to whether the ACTION tag contains a key word (step 610). In these examples, the key word may be, for example, search or find. If a key word is found, the contents of the FORM tag are a candidate for a search object. Then, the input tags are parsed (step 612). The determination is made as to whether the INPUT is of type TEXT or HIDDEN (step 614). If the INPUT is of the type TEXT or HIDDEN then the TYPE, VALUE, and NAME are stored in an INPUT object vector (step 616).

INPUT is an HTML tag for flagging input parameters

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inside a "FORM" tag. INPUT tags can have types, two of which are "HIDDEN" and "TEXT". A "TEXT" and a "HIDDEN" type of INPUT have many attributes, but "NAME" and "VALUE" are two attributes captured because they are the ones which are passed as parameters to the search object.

A determination is then made as to whether all of the INPUTS have been parsed (step 618). If all of the INPUTS have been parsed, then a valid URL is created from the stored ACTION and the INPUTS and this information is posted or sent to the server (step 620) with the process terminating thereafter.

With reference again to step 618, if all of the INPUTS have not been parsed, the process then returns to step 612 as described above.

With reference again to step 614, if the INPUT is not of a type TEXT or HIDDEN, the process then proceeds to step 618 as described above.

With reference again to step 610, if the ACTION identified by the ACTION tag does not contain a key word, then a determination is made as to whether all of the HTML document has been parsed (step 622). If all of the HTML document has not been parsed, the process then continues to parse the HTML document for the next FORM tag (step 624) with the process then proceeding to step 606 as described above. On the other hand, if the entire HTML document has been parsed, the process terminates. With referenced back to step 606, if a FORM tag is not found then the process proceeds to step 622 as described above.

Turning next to **Figures 7A** and **7B**, diagrams illustrating one method of code used for finding a search object in an HTML document are depicted in accordance

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with a preferred embodiment of the present invention.

Thus, the present invention provides an improved method, apparatus, and computer instructions for simplifying the process used to search for information on a Web site. The mechanism provides this advantage through avoiding having to download all the contents used to present a Web page to a user. Only the base HTML document is downloaded. Objects identified or pointed to by the document for presentation are not downloaded in these examples.

Although the depicted examples illustrate the implementation of the processes of the present invention in a browser, the processes may be implemented in other forms. For example, the processes may be implemented using a script file or within an application, such as a word processor. Also, the examples are described with respect to HTML, but the processes of the present invention may be applied to other markup languages.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example,

radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

5 The description of the present invention has been
presented for purposes of illustration and description,
and is not intended to be exhaustive or limited to the
invention in the form disclosed. Many modifications and
variations will be apparent to those of ordinary skill in
10 the art. The embodiment was chosen and described in
order to best explain the principles of the invention,
the practical application, and to enable others of
ordinary skill in the art to understand the invention for
various embodiments with various modifications as are
15 suited to the particular use contemplated.